WO 00/43272

PACKING MADE FROM A FILM-LIKE LAMINATE AND PROCESS FOR PRODUCTION OF THIS PACKING

The present invention concerns a packing with a tear aid and sealed edges, made from a film-like laminate material, a process for production of the packing, means for production of the packing and use of the packing.

Sealed edge bags are known, for example, which are used for packing powdery or solid fillings. Typical fillings can come from the area of foodstuffs and luxuries such as powdered instant coffee or chocolate bars, dairy produce such as yoghurt and the like. The packing must protect the filling against mechanical, chemical and physical influences. Therefore, in many cases such packings are made from multilayer materials where individual material layers or a material layer combination can have a specific protective function. The packing material must for example be tear-resistant. This requires very extendible or stretchable materials of high structural strength. Opening packings made from such materials is difficult and cannot be achieved without the aid of scissors or a knife. To facilitate opening without a tool, therefore, tear aids are regularly fitted to the packing. A tear aid can for example be a notch on the outer edge of a sealing seam. The material of the packing equipped in this way can be torn open very easily, on further tearing through the bag wall the direction of tear can no longer be controlled and the resulting opening is often incomplete or leads to the centre through a side wall. The tear aid must be applied in the packing machine. This reduces the operating speed of the packing machine. In many cases attempts are made to eliminate the disadvantages by placing a tear strip between two material layers, and by pulling of the tear strip the packing material is split. The resulting opening is clearly defined but the production of this tear aid is complex and leads to inflexible production processes.

The task of the present invention is to propose a packing which offers optimum protection to the filling but nonetheless is easy to open, can be produced in a simple manner and minimises the use of machines while retaining maximum freedom with regard to packing design.

According to the invention this is achieved by the film-like laminate material being multilayer and at least one material layer of the laminate has no weakened zones and at least one material layer of the laminate has weakened zones and the weakened zones on the packing lie at least partly in the area of the filling cavity.

Examples of packings according to the present inventions are sachets such as flat sachets, sealed edge sachets, cavity sachets, self-supporting cavity sachets or hose sachets or bags such as welded flat or folded bags. Similarly the packing can have at least one sealing seam on a side edge, e.g. a sealing seam such as a hot or cold sealing seam, weld seam or glue seam. Depending on the method of production, flat sachets can for example have three or four sealing seams on three or four side edges, a hose sachet can have an upper and a lower transverse seam or an upper and a lower and a back seam such as an overlapping or folded back seam.

The weakened zones on the packing according to the invention preferably lie in the area of the sealed edges and/or in areas in which by folding and/or sealing, the laminate material forms two or more layers. The weakened zones can for example extend from an outer border of a sealed edge, through this to over the filling cavity of a packing. One or more of the weakened zones can for example extend from an outer edge of a packing over the filling cavity of a packing. One or more of the weakened zones can for example also extend only over the cavity of a packing. Several weakened zones are advantageously located in a substantially straight line. Weakened zones are advantageously placed in

the area of an edge closure or sealed edge closure of a packing. For example, the area, measured from an edge closure or sealed edge closure, can extend up to 50 mm, suitably up to 20 mm, over the filling cavity. The area can also extend at a distance of 2 to 20 mm parallel to an edge closure or sealed edge closure over the filling cavity in a width of for example 5 to 50 mm, suitably 5 to 20 mm.

The film-like laminate material is multilayer, for example two, three, four layer etc. The individual material layers can be lacquer applications, metal films, metallised coatings or films of plastics, in particular thermoplastics, or laminates of metal films and plastic films. One or more material layers can be extruded and in particular melt-extruded layers or films of thermoplastics, where applicable laminated with metal or plastic films. At least one material layer can be a lacquer application such as a clear lacquer, a colour lacquer, a hot melt coating etc. At least one material layer can be a metallised coating or a ceramic thin coating deposited from a vacuum. Between the individual coatings can be adhesives, extrusion adhesives, adhesion promotion agents and/or primers. To increase the mutual adhesion of the coatings, the surfaces of the films, coatings or material layers can for example be subjected to corona, flame, ozone or plasma treatment.

Material layers of thermoplastics can be transparent, translucent or opaque. For example the material layer, film or coating on the outside of the packing can be printed. In the case of a transparent or translucent outer material layer, film or coating, counter-printing or external printing and counter-printing can be applied.

For metal films for example, steel foils and preferably aluminium foils are used. The thickness of the foil can for example be 5 to 100 µm, preferably 8 to 30 µm.

Suitable plastic films are suitably made of thermoplastics such as polyesters, polyolefins such as polypropylenes or polyethylenes, polyamides, polyvinyl chloride, polycarbonate etc. or cellulose-containing materials such as cellophane. Plastic films can be monofilms or film laminates. The thickness of the plastic films can for example be 8 to 100 µm, preferably 12 to 30 µm and in particular 12 to 23 µm.

Extruded or melt-extruded layers can for example be made of polyolefins such as polypropylenes or polyethylenes. The thickness of the extrudates can for example be 8 to 100 µm, preferably 12 to 30 µm, and in particular 12 to 23 µm.

The side of the laminate material facing the inside of the packing can advantageously be sealed. Where applicable the side of the laminate material facing the outside can also be sealed.

Examples of multilayer laminates are laminates containing a first material layer and a second material layer. The first material layer can be a film such as a monofilm or laminate of thermoplastics such as polyesters, polyolefins such as polypropylenes or polyethylenes, polyamides, polyvinyl chloride, polycarbonate etc. or cellulose- containing materials such as cellophane or papers. The film can be printed and/or counter-printed on the side of the finished packing facing the outside. The second material layer can for example be a metal foil or metal film with a sealing coating applied to the side of the finished packing facing the inside, or a sealable film. The second material layer can in another embodiment be a sealable film of thermoplastic or an extrusion layer of a thermoplastic which is preferably sealable. Where applicable, papers can be used e.g. coated papers as a second material layer. Where applicable as the second material layer lacquer coatings or paint applications can be used. The lacquers can be clear, opaque or colourless or coloured. Depending on the product to be packed, the laminate material can have barrier

properties against the penetration of fluids, gases, vapours, water vapour, aromas or flavourings etc. To achieve barrier properties one can use metal foils, metallised coatings e.g. of aluminium, ceramic thin coatings e.g. from silicon oxides and/or aluminium oxide applied by sputtering or deposition under vacuum, or plastic films e.g. materials from the range of styrene copolymers, ethyl vinyl alcohol polymers or polyvinylidene chloride. Examples of sealable materials for the films or extrudates are polyolefins such as polyethylene, polypropylene or co- and terpolymers of ethylene with acrylic acid. The sealability of the laminate can also be achieved by application of a sealing lacquer.

From said material layers the following laminate materials can for example be made, where the material layers can be connected together where applicable by adhesives, adhesion promotion agents and/or primers, or the second material layer can be applied to the first material layer by extrusion such as melt extrusion:

a) first material layer of a_1) where applicable printed,
a_2) film of polyesters, polyolefins such as polypropylenes or polyethylenes, polyamides, polyvinyl chloride, polycarbonate etc.;
a_3) where applicable counter-printing;

b) connected by means of an adhesion promotion agent, adhesive coating or extrusion coating with

c) second material layer of c_1) metal film,
c_2) adhesion promotion agent, adhesive layer,
c_3) sealing film or sealable extrusion coating or sealing lacquer;

or in a further embodiment a

a) first material layer of a_1) where applicable printed,

a_2) film of polyesters, polyolefins such as polypropylenes or polyethylenes, polyamides, polyvinyl chloride, polycarbonate etc.
a_3) where applicable counter-printing;

b) connected by means of an adhesion promotion agent, adhesive coating or extrusion coating with

c) second material layer of sealing film or sealable extrusion layer.

Further embodiments are

a) first material layer of a_1) where applicable with printing on
a_2) paper,

b) connected by means of an adhesion promotion agent, adhesive coating or extrusion coating with

c) second material layer of a polyolefin coating and in particular a polypropylene coating e.g. in a thickness of up to 100 µm, preferably 50 to 80 µm;

or

a) first material layer of a_1) where applicable with printing,
a_2) film of polyesters such as polyethylene, polyethylene terephthalate,
a_3) where applicable counter-printing

b) connected where applicable by means of an adhesion promotion agent, adhesive coating or extrusion coating with

c) a metal film or applied metallised coating, and

d) connected by means of an adhesion promotion agent, adhesive coating or extrusion coating with

e) second material layer of a film of polyolefins such as polyethylene;

or

a) a first material layer of a_1) where applicable printed,
a_2) film of polyesters, polyolefins such as polypropylenes or polyethylenes, polyamides, polyvinyl chloride, polycarbonate etc.
a_3) where applicable counter-printing and

b) a second material layer of a lacquer coating or sealable extrusion coating.

In the latter case the counter-printing a_3) can simultaneously constitute the second material layer.

The laminate material has weakened zones in at least one material layer of the laminate material. Preferably the weakened zones are provided on the first material layer of the laminate material. It is also possible to provide the weakened zones on the second material layer or on the first and second layers of the laminate material. In the last case it is advantageous for the weakened zones of the first material layer and the second material layer of a laminate material not to be arranged above each other but offset from each other. Weakened zones can for example be material weaknesses such as thinner material, material removed or notches in the material, or cuts in the form of individual cuts or a sequence of cuts, in particular arranged in parallel, or in the form of perforations etc. Particularly preferred as weakened zones are cut sequences or a multiplicity of individual cuts arranged in parallel. The cut direction advantageously runs in the tear direction. For example, the space between the cuts is for example 0.1 to 1

mm, the length of the cuts 1 to 50 mm and the number of cuts per weakened zone can be 2 to 50. The weakened zones can be located only over the filling cavity of a packing, or over the filling cavity and extend to within a sealed edge or side seam. The material layer or layers with weakened zones on a packing advantageously constitute an external layer or layer facing the outside of the laminate material.

The present invention also concerns a process for application of the weakened zones to the laminate material. The laminate material is produced by provision of the first material layer, where applicable printing of the first material layer on one or both sides and simultaneous application of the weakened zones in the register. Suitable printing processes are for example book, offset, flexo, screen and rotogravure printing. The first material layer can be weakened in the area of the printing machine, before, between two colour applications, or after the printing ink application. The weakened zones can be generated by the application of weaknesses or perforations. This can be achieved mechanically for example by blades such as oscillating blades, rotating blades fitted to a cylinder, punch blades or needles etc. Other devices for application of the weakened zones are energy-rich radiation such as laser beams or electron beams. Such processes normally lead to micro perforations. The weaknesses are applied to the first material layer in the register i.e. in synchrony with the printing. This allows precise alignment of the weakening at the same time as precise alignment of the printing on the packing material. It is also possible to perform the weakening at the start or during the printing ink application or before any proposed lacquer or protective lacquer application. The weakening is then covered by the printing inks and/or lacquer or protective lacquer. Thus a barrier effect is achieved against the exchange of substances from moisture, gases etc., for example, through the openings of a perforation or a cut. At the same time the weakened zones can be stabilised with regard to tear

strength without making it difficult to achieve the desired tear-opening. Preferably, the printing and weakening processes are performed continuously on endless or rolled goods, the processing of films or leaves is however also possible.

According to the process steps described, the first material layer and the provided second material layer are joined and connected together preferably continuously. The first material layer and second material layer as endless goods can for example be connected together inseparably by lamination or adhesion of the two material layers by means of an extrusion laminator or adhesive. For example, lacquer lamination adhesives, adhesion promotion agents and/or primers can be used. Examples of adhesives are also waxes, watery glues, plastic dispersions and high pressure polyethylene layers.

The second material layer can be applied to the first material layer also by coating or by extrusion, where under pressure and heat a thermoplastic, for example high pressure polyethylene, is melted and pressed as a thin film onto the one surface of the first material layer. If the second material layer is a lacquer application, the lacquer can be applied as a second material layer in quantities of for example 0.5 to 50 g/m^2, preferably 1.0 to 25 g/m^2 e.g. by pouring, spraying, spreading, smooth roller application etc. onto a first material layer already containing weakened zones. The lacquers can be solvent-based and dried or hardened by vaporisation of the solvent or the lacquers can be hardened by energy-rich radiation. Suitable lacquers are for example acrylate- or methacrylate-based, or lacquers from the range containing polyester, epoxides, cellulose nitrate, polyvinyl chloride, polyvinyl butyral or mixtures thereof.

The laminate material produced in this way can be introduced into a packing machine for example in endless or roll form

and used for packing goods. Due to the production process according to the invention, the printing and the weakened zones on the laminate lie in unchanging position to each other. High quality packing units are characterised in that the printing always corresponds to the pack size and is always positioned identically in relation to the filling. Thus with the use of the present laminate material the weakened zones corresponding to the printing always lie at the same point on every packing unit. Typical packing units are for example polygonal and in particular rectangular in top view. In cross section the packing units can be round or polygonal and in particular rectangular. The weakened zones are for example in the area of the side edges and in longitudinal packing units in the area of one of the two long ends. In relation to the cross section of the packing unit the weakened zones suitably lie on one or both side edges. Where a packing unit has points at which the packing material forms several material layers due to folding or gluing, preferably in this area there is a weakened zone on at least one material layer. For packing units with a back seam, there is at least one weakened zone in the area of this back seam. On packing units with a back seam, for example, several weakened zones can be placed in a line in the area of one of the two long sides on one or both side edges and in the area of the back seam.

Figures 1 to 7 show for example various aspects of the present invention.

Figure 1 shows diagrammatically the production and simultaneous filling of the product in a hose sachet with a folded back seam.

Figure 2 shows a top view of an example of a packing unit of a laminate material according to the present invention and drawn below this a section through a packing along line A-A.

Figure 3 shows the top view of a further example of a packing unit of a laminate material according to the present invention and drawn below this a section through the packing along line B-B.

Figure 4 shows the top view of a further example of a packing unit of a laminate material according to the present invention and drawn below this a section through the packing along line C-C.

Figure 5 shows a diagrammatic section through a variant of the laminate according to the present invention.

Figure 6 shows a diagrammatic section through a further variant of the laminate according to the present invention.

Figure 7 shows a diagrammatic section through a further variant of the laminate according to the present invention.

Figure 8 shows a diagrammatic section through a further variant of the laminate according to the present invention.

Figure 1 shows a store of laminate material 10 in roll or endless form guided in the direction of arrow 11. Device parts of a packing machine which are not shown continuously fold and weld the folded longitudinal back seam 12 and the transverse seam 13. Also, in the direction of arrow 11 and at the point indicated by the arrow, the filling, for example chocolate bars, is inserted. The transverse seams 13 are laid in cycles, forming packing units 14. By means of cut 15 the packing units 16 are separated. The packing unit 16 has at both ends a transverse seam 17 and the folded longitudinal back seam 19.

Figure 2 shows a packing unit 16 with transverse seams 17 and longitudinal folded back seam 19. Parallel to a transverse seam 17 over the full width 21 are several weakened zones 20. A cross section through a packing unit 16

along line A-A shows the folded back seam 19. The weakened zones 20 lie at the side edges and at the point, here the back seam 19, at which the laminate material 22 lies in several material layers by folding and gluing. The laminate material surrounds the filling cavity 28.

Figure 3 shows a packing unit 16a with the transverse seams 17a and longitudinal overlapping back seam 23. Parallel to a transverse seam 17a over the filling area 21a are several weakened zones 20a. A cross section through a packing unit 16a along line B-B shows the overlapping back seam 19a. The weakened zones 20a lie at the side edges and at the point, here the overlapping back seam 23, at which the laminate material 22a lies in two material layers by gluing. The laminate material 22a surrounds the filling cavity 28a.

Figure 4 shows the packing unit 16b with transverse seams 17b. The one transverse seam 17b extends unilaterally in the bag direction. In this extension of transverse seam 17 is a tear aid 27 and a perforation 26 which substantially extends through the entire thickness of the transverse seam 17b. The packing unit 16b is formed by a C-shaped alignment of the laminate material 22b and sealing of the edges on an inserted strip 25 of a sealable laminate, for example the structure
polyethylene/adhesive/polyester/adhesive/polyethylene. By sealing the side edges of the laminate material at the strips 25, the longitudinal back seam 24 is formed. Parallel to a transverse seam 17b, substantially over the filling area 21a, are arranged two weakened zones 20b. For example the weakened zones can be a sequence of cuts, where the cut direction runs in the tear direction. In the present example the cut sequence constitutes the extension of the perforation 26. If the packing unit 16b is opened, the packing can be torn by way of the notch 27 in the sealed area of transverse seam 17b. The packing material is torn further by the perforation 26. The perforation 26 ends in the sealed area 17b. Due to the weakened zone 20 over the

filling area, however, it is easy to tear along at least one cut of the cut sequence formed by the weakened zones 20. The cross section through a packing unit 16b along line C-C shows the longitudinal back seam 24. The weakened zones 20b lie on one of the side edges and at the point at which the laminate material 22b and the strips 25 lie above each other in two material layers. The laminate material 22b surrounds the filling cavity 28b.

Figure 5 shows the section through the structure of the film-like laminate material for the packing according to the invention, containing the first material layer of a film of thermoplastic 32 which carries a print 34 and a counter-print 35 and has a weakened zone 20. The second material layer of an aluminium foil 30, an adhesive coating 37 and a sealing coating 36 is connected to the first material layer by way of the adhesive coating or extrusion coating 31.

Figure 6 shows a section through the structure of the film-like laminate material for the packing according to the invention, containing the first material layer of a film of thermoplastic 32 which carries a print 34 and a counter-print 35 and has a weakened zone 20. The second material layer of an aluminium foil 30, and extruded on this a sealing coating 36a, is connected to the first material layer by the adhesive coating or extrusion coating 31.

Figure 7 shows a section through the structure of the film-like laminate material for the packing according to the invention, containing the first material layer of a film of thermoplastic 32 which carries a print 34 and a counter-print 35 and has a weakened zone 20. The second material layer of a sealing coating 36b is connected to the first material layer by way of the adhesive coating 31b.

Figure 8 shows a section through the structure of the film-like laminate material for the packing according to the invention, containing the first material layer of a film of

thermoplastic 32 which carries a print 34 and a counter-print 35 and has a weakened zone 20. The second material layer is a coating 33 extruded onto the first material layer and made of a thermoplastic with sealing properties.

The present packings are suitable for example for holding liquid, powdery, granulate, solid or paste fillings. Liquid fillings range from drinks, juices etc. to cleaners or similar. Typical examples of fillings are powdery and granular foodstuffs and luxuries such as instant soup, instant coffee, coffee powder, custard powder, herbs etc. Solid fillings e.g. can take the form of blocks, slabs or bars. Examples are chocolate bars and muesli bars. In addition, the packing is suitable for paste-like foodstuffs such as yoghurt and other dairy produce, and other paste substances, for example from the area of personal hygiene and cosmetics such as shampoos or lotions, or to hold lipsticks, cotton buds, soaps etc. Finally, the packing according to the invention can also hold medical devices or applicators and technical articles.